

## **RELATIONSHIP BETWEEN SEDENTARY AND ACTIVE LEISURE PARTICIPATION AMONG MIDWESTERN COLLEGE STUDENTS**

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### **ABSTRACT**

*This study used the Catharsis Theory and the Stimulation Theory to examine the relationship between sedentary leisure participation (watching television (TV), videos or DVDs and computer or video game playing) and active leisure participation (strength sport, recreational sport and team sport) within a sample of 1134 Midwestern college students in the United States. Multinomial logistic regression analyses were upheld for both theories. Findings showed that (1) college students who spent less than three hours per day watching TV, videos or DVDs on weekdays were more likely to engage in strength and recreational sports than those spending four or more hours per day; and (2) college students who did not play computer/video games on weekdays were less likely to participate in team sport than those who spent at least one hour per day. The variables, gender and ethnicity, were found to be significant predictors across different active leisure activities. Based on the research findings, promotion of active leisure participation requires tailored approaches that are dependent on the target segment of the college student populations.*

**Key words:** Sedentary leisure; Active leisure; Catharsis Theory; Stimulation Theory; College students.

### **INTRODUCTION**

Completed research indicates that participation in physical activity increases overall physical and psychological health across different populations (Kull, 2002; US Department of Health and Human Services, 2004; Payne *et al.*, 2006; Lloyd & Little, 2010). Despite various benefits that can result from participation in physical activity, a considerable population-wide decline in physical activity and an increase in sedentary leisure behaviour (TV/computer/video usage) among adolescents and young adults were identified in the literature (Gordon-Larsen *et al.*, 2004; Brownson *et al.*, 2005; Statistics Canada, 2006). One research question that could help to understand this decline in physical activity is “does participation in a sedentary leisure activity increase or decrease the chance of participation in certain kinds of physical activities?” To date, little research has been directed towards

answering this question, for example, by examining relationships among different kinds of leisure participation (Pagano *et al.*, 2006).

The meaning of leisure has been defined in four ways: time free for making personal choices (Russell, 2002); participation in recreational activities; a state of mind (Kelly & Freysinger, 2000; Edginton *et al.*, 2002); and an entire way of being (Neulinger, 1974; Murphy, 1981; Kraus, 1984). The second definition of leisure is most commonly used because it can be easily observed and measured by researchers (Mannell & Kleiber, 1997; Loucks-Atkinson & Mannell, 2007).

Although leisure participation has been categorised in various ways, the degree of physical exertion is used in this article to distinguish two types of leisure activities: 1) active leisure; and 2) sedentary leisure. While active leisure implies a desired exertion of energy, sedentary leisure implies a desire to refrain from exerting energy. Active leisure participation is usually classified as physical activities that need physical effort and energy expenditure (such as swimming and dancing), and sedentary leisure participation is classified as non-physical activities (including watching TV, videos and DVDs, playing computer/video games) (Dardis *et al.*, 1994; Sylvia-Bobiak & Caldwell, 2006).

This study aims to examine the relationship between these two types of leisure activities for two reasons. On the one hand, this classification has been empirically tested (Pagano *et al.*, 2006) and widely used by previous researchers (Dardis *et al.*, 1994; Mull *et al.*, 1997; Sylvia-Bobiak & Caldwell, 2006) and organisations. On the other hand, college students spent most of their time on these two types of leisure activities (sport, TV watching and video games), and this amount of time is increasing. On the contrary, the percentage of subjects who took part in shopping, touring, outdoor, cultural and hobby leisure activities was quite consistent over time (Hall, 1984).

The Centres for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) recommend accumulating 30 minutes or more of moderately intense physical activity on all or most days of the week. Related to this recommendation, the American Academy of Paediatrics (AAP's) Committee on Public Education recommends engaging in less than two hours of TV/video viewing and computer/video games per day. The AAP's recommendation on media exposure was not based exclusively on physical inactivity. It was also based on other detrimental effects that could result from media exposure, such as the risk of increased violent and aggressive behaviour, an increased use of alcohol, tobacco and other drugs, and an accelerated onset of sexual activity. Despite these recommendations, little consensus has been reached on the effects of media exposure on active leisure behaviour. Conflicting and inconclusive findings are noted in the literature regarding the relationship between active and sedentary leisure participation (Gordon-Larsen *et al.*, 2000; Sallis *et al.*, 2000; Russell, 2002; Santo *et al.*, 2005; Bennett *et al.*, 2006). This study was designed to contribute to the literature by examining the relationship between active and sedentary leisure participation among college students in the United States (US).

College students were chosen as the target population of this research due to their transition from adolescence to young adulthood involving substantial changes in their lifestyles, relationships and leisure activities (Sylvia-Bobiak & Caldwell, 2006). Students have more

control over their leisure choices in college than in high school, mainly because in college they are often separated from their former high school peers and families. Also, most college students can play video games or watch TV/videos without a parent's permission. On the other hand, they are more exposed to sport activities when in college as compared to their high school years, and this could be conducive to engaging in more physical activity. The college environment offers both risk and opportunity in respect of physical activity participation. A better understanding of young adults' voluntary choice and pursuit of a balance between passive and active leisure will: 1) reveal effective interventions for constructive and healthy leisure choices among young adults; and 2) provide an insight into which of the two theoretical frameworks, the Catharsis Theory or the Stimulation Theory, would be a better model to explain the relationship between sedentary and active leisure pursuits.

Research on the impact on leisure behaviour of playing video and computer games has a comparatively short history because they did not arise as popular leisure activities until the last two decades. According to Interactive Digital Software Association (2001a; 2001b), video games are increasingly popular, with 42% of households in the US owning a video game console. In addition, Roberts *et al.* (1999) indicated that young adults are frequent users. Video game research has typically adopted strategies arising from research that has evaluated the effects of television on violent behaviour (Funk, 1992; Christensen & Wood, 2007; Sherry, 2007). However, playing video games adds an active dimension that intensifies the impact of game playing as compared to the relative passive influence of watching television (Chambers & Ascione, 1987; Funk & Buchman, 1996). Due to the increased popularity of video games among young adults and the paucity of research regarding its impact on active leisure behaviour, the current research aimed to explore this relationship by examining screen time viewing, computer/video game playing and participation in different types of active leisure among college students.

## THEORETICAL FRAMEWORKS

To explain the impact of sedentary leisure on college students' subsequent participation in physical activity, this study used leisure theories explaining why people participate in active leisure, and media theories exploring how the media influences people's leisure behaviour. The research questions in this study are: what is the relationship between active and sedentary leisure?; and how do types of leisure activities moderate this relationship? In general, these theoretical explanations can be grouped into two categories (the Catharsis Theory and the Stimulation Theory).

The *Catharsis Theory* views recreational sport as a positive and safe outlet for the release of negative emotions (Ellis, 1973). According to this theory, a negative emotion such as aggression, if not given a safe outlet, will build up and be let out in a harmful way, such as fighting (Leitner & Leitner, 2004), whereas the surplus energy theory provides a consistent prediction stating that people participate in leisure activities in order to release excess energy (Ellis, 1973). In contrast, the recreation theory asserts that people play to restore energy (Weiskopf, 1982). This apparent conflict is influenced by previous findings concerning the relationships between different psychological needs and leisure activities (Leitner & Leitner, 2004). For example, competitive games and sport such as football and basketball are

appropriate leisure activities for the release of aggressive impulses, whereas non-competitive sport and games such as dancing and hiking can eliminate feelings of inferiority or superiority. In media studies, the Catharsis Theory explains that the exposure to media violence would permit angry or frustrated viewers to purge their feelings such that after viewing was completed, they would be less likely to behave aggressively (Dominick, 1984; Calvert & Tan, 1994). A similar theory (drive reduction theory) contends that people struggle to maintain physical, emotional and psychological equilibrium (Sherry, 2007). Sherry and Lucas (2003) reported that individuals use video games for managing arousal. Sherry (2007) highlighted that individuals may choose to engage in passive leisure activities (violent video games) to manage negative emotions (aggression).

According to the catharsis theory, an individual exposed to a tension or anxiety producing situation seeks emotional release through participation in either high-energy-consuming or relaxing activities, depending on the individual's preferred means of unwinding (Witt & Bishop, 2009). Therefore, the Catharsis Theory predicts that both active leisure and sedentary leisure can provide a safe outlet for negative emotions and the time that people spend on active leisure will be negatively correlated with the time that people spend on sedentary leisure. That is, people who spend more time watching TV, videos and DVDs or playing computer or video games are less likely to engage in inactive leisure activities.

The second group of theories is best represented by the *Stimulation Theory*, which argues that viewing violence prompts more aggression on the part of the viewer (Wimmer & Dominick, 2000). This theory postulates that an individual's predisposition to act aggressively will be heightened by the arousing effects of media. A study revealed that media violence enhances adolescents' aggression in interactions with strangers, classmates and friends (Christensen & Wood, 2007). Through exposure to violence and antisocial acts, people will be desensitised and will therefore become less anxious about the consequences. Another stimulation-related theory, arousal-seeking theory, states that people need a certain level of physical and mental activity (Russell, 2002), and since some individuals strive to maintain an optimal state of stimulus, they will attend physical activities. This theory suggests that, whenever media content arouses a student, he or she would like to keep that arousal and pursue further excitement through real exertion of physical energy.

Based on the above theories, a person who is more stimulated by media exposure is more likely to heighten his or her arousal level and thus will be more likely to seek his or her optimal state of stimulus from relatively competitive physical activities. In other words, all these theories suggest that watching TV, viewing videos and playing video games can stimulate people's emotion to indulge in more active behaviours. People who spend more time watching TV, videos and DVDs or playing computer/video games are more likely to engage in active leisure activities.

The total amount of leisure time is an important moderator of the relationship between active leisure and sedentary leisure. Since people have limited time, leisure behaviours (no matter what type) will compete with each other. Russell (2002) argued that a common criticism of TV watching is that it replaces more active leisure. However, decades of time-use surveys revealed a dramatic increase in overall leisure time between 1965 and 2003 (National Bureau of Economic Research, 2006). Specifically, time devoted to leisure by men increased by 6-8

hours per week and for women by 4-8 hours per week. This increase in leisure results from approximately 5-10 additional weeks of vacation per year. Robinson (1969, 1981) found that some early substitutes of TV, such as listening to radio, visiting, housework and reading newspapers have continued to decline as TV viewing time seeks a new plateau. However, away-from-home activities are the most successful competitors for Americans' leisure time. This suggests that active leisure is not necessarily reduced by an increase in the time spent watching TV or playing video games. Nevertheless, this study will control this variable by including student's time spent on studying.

## **METHODOLOGY**

### **Sample**

A convenience sample of college students were recruited from four different universities located in three Midwestern states in the US. Before the administration of the questionnaire, an approval of the research protocol was received from the institutional review boards of the participating universities. During the academic year of 2004-05, college instructors and research assistants administered the questionnaire to a sample of students (N=1200) enrolled in health-related courses on all campuses. To ensure voluntary and anonymous participation, a passive consent letter was attached to the front of the questionnaire. Out of the 1200 students, 1163 (97%) participated in the survey. Prior to the treatment of the collected data, two exclusion criteria were investigated: 1) cases that showed systemic response patterns such as answering all questions '1' ("protest response") were deleted; and 2) cases that contained more than 10% of no responses to the question items were deleted. Through this procedure, a total of 29 questionnaires were eliminated, reducing the sample size to 1134 (response rate of 94.5%).

### **Measurement instrument**

To develop the survey instrument for this study, researchers combined questions primarily derived from the 2005 Youth Risk Behaviour Survey (YRBS) questionnaire and the 2004 Behavioural Risk Factor Surveillance System (BRFSS) questionnaire developed by the Centres for Disease Control and Prevention (CDC). Since valid and reliable scales were documented in the literature and were available, researchers made every effort to use these scales intact. Three questions regarding demographics of participants derived from BRFSS were self-reported age, gender and ethnicity.

Active leisure activities were measured by a single question drawn from the literature (Peretti-Watel *et al.*, 2002). The participants were asked, "Which of the following categories best represents the exercise or sporting activities you practice most frequently?" The response options of this question included 'team sport' (basketball, baseball, etc.), 'athletic sport' (running, cycling, etc.), 'strength sport' (weightlifting, body-building, etc.), 'martial arts and combat sport' (taekwondo, boxing, etc.), other 'recreational sport' (tennis, golf, etc.), and 'I do not play any sport'. For time spent watching TV, videos or DVDs on an average weekday, the participants were asked, "On an average weekday, how many hours do you watch TV, videos, or DVDs?" Response options included 'I do not watch TV, videos, or DVDs on an average weekday', 'less than 1 hour per day', '1 hour per day', '2 hours per day', '3 hours per

day', '4 hours per day' and '5 or more hours per day'. Similarly, a single item was used to measure participants' time spent playing computer/video games on an average weekday. The respondents were asked, "On an average weekday, how many hours do you spend playing computer/video game?" The response options for this item were the same as the previous question. Participants' time spent on studying was measured by asking: "In the past 7 days, how many hours have you spent on studying for your classes (assignments, papers, exams, etc.), not including actual class attendance?" The response options provided for this item included: '0-5 hours', '6-10 hours', '11-15 hours', '16-20 hours', '21-25 hours', '26-30 hours'. Regarding their intentions about their body weight, respondents were asked: "Which of the following are you trying to do about your weight?" Response options of this item included 'lose weight', 'gain weight', 'stay the same weight', and 'I am not trying to do anything about my weight'.

### **Statistical procedures**

The Windows version 17.0 of the Statistical Package for Social Sciences (SPSS) was used to conduct statistical analyses. Frequencies and percentages of each response were calculated for all respondents. Before selecting variables for logistic regression analysis, the bivariate associations of each variable with the outcome variable applying likelihood ratio chi-square test was examined. After fitting a logistic regression model for each variable to obtain unadjusted odds ratios (ORs) and 95% confidence intervals (CIs), the variables with a bivariate  $p < 0.25$  were selected as candidates for the multivariate model (Mickey & Greenland, 1989; Hosmer & Lemeshow, 2000).

Backward likelihood ratio elimination with a threshold of  $p < 0.05$  was used for retention in the model followed by a test for forward selection to minimise the possibility of multicollinearity (Hosmer & Lemeshow, 2000). Response options were collapsed in instances of those variables with few cases for the purpose that the assumption of adequate cell-size in chi-square tests and logistic regression analyses could be satisfied. For example, the six categories of active leisure activities were collapsed into four options, which were strength sport, recreational sport, team sport and those who do not play any sport.

Multinomial logistic regression was performed for the outcome variable with four categories to investigate odds ratios (ORs) of correlates regarding sedentary leisure activities after adjusting for other documented correlates of active leisure activities. The categorical outcome variable in this study was active leisure activity which was collapsed into four categories, including team sport, recreational sport, strength sport, and non-participation in any sport. Non-participation in any sport was taken as reference group in the multinomial logistic regressions analyses.

The variable entry in the model was made in the order of: 1) gender, race; 2) time spent on studying; 3) intention to lose weight; and 4) time spent watching TV, videos or DVDs, and time spent playing computer/video game. The variable that is well documented in the literature and demographic or hard-to-intervene variables were entered into the model first, and then the variable of research concern or easy-to-intervene variable was entered last. Furthermore, similar variables were entered together. For instance, time spent watching TV, videos or DVDs, and time spent playing computer/video games were entered last and at the same time because both of them are variables of research concern.

## RESULTS

### Descriptive findings

In this study, most of the college students of 18-23 years of age were the dominant respondents. Only 6% of the participants were between 24 and 46 years old. As shown in Table 1, most of the college students were female (61%) and White (81%), with 19% of the total respondents being Non-white. Specifically, white respondents include those labelled as non-Hispanic White, while Non-white respondents would be of a Hispanic, Latino or Spanish origin, African Americans, Asian/Pacific Islanders, and other races or ethnicity.

TABLE 1: FREQUENCY OF STUDENTS' ACTIVE LEISURE

Variables	Total F (%)	<sup>a</sup> Strength Sport F (%)	<sup>b</sup> Recreational Sport F (%)	<sup>c</sup> Team Sport F (%)	<sup>d</sup> No Sport F (%)
<i>Gender</i>					
Male	439 (38.7)	106 (24.1)	115 (26.2)	197 (44.9)	21 (4.8)
Female	695 (61.3)	48 (6.9)	359 (51.7)	138 (19.9)	150 (21.6)
<i>Race</i>					
White	918 (81.0)	126 (13.7)	404 (44.0)	266 (29.0)	122 (13.3)
Non-White	216 (19.0)	28 (13.0)	70 (32.4)	69 (31.9)	49 (22.7)
<i>Hours of study</i>					
10 hrs or less	694 (61.2)	98 (14.1)	284 (40.9)	206 (29.7)	106 (15.3)
11-20 hrs	325 (28.7)	40 (12.3)	129 (39.7)	100 (30.8)	56 (17.2)
21 hrs or more	115 (10.1)	16 (13.9)	61 (53.0)	29 (25.2)	9 (7.8)
<i>Weight</i>					
Same weight	268 (23.6)	31 (11.6)	106 (39.6)	92 (34.3)	39 (14.6)
Gain weight	163 (14.4)	45 (27.6)	31 (19.0)	75 (46.0)	12 (7.4)
Lose weight	577 (50.9)	63 (10.9)	294 (51.0)	129 (22.4)	91 (15.8)
No action	126 (11.1)	15 (11.9)	43 (34.1)	39 (31.0)	29 (23.0)
<i>Watching TV/video on weekdays</i>					
Less than 1 hr p.d.	234 (20.6)	31 (13.2)	119 (50.9)	55 (23.5)	29 (12.4)
1-3 hrs p.d.	744 (65.6)	103 (13.8)	307 (41.3)	226 (30.4)	108 (14.5)
4 or more hrs p.d.	156 (13.8)	20 (12.8)	48 (30.8)	54 (34.6)	34 (21.8)
<i>Playing video games on weekdays</i>					
Don't play	524 (46.2)	56 (10.6)	260 (49.6)	113 (21.5)	95 (18.1)
Less than 1 hr p.d.	266 (23.4)	39 (14.6)	100 (37.5)	90 (33.8)	37 (13.9)
At least 1 hr p.d.	344 (30.3)	59 (17.1)	114 (33.1)	132 (38.3)	39 (11.3)
<b>Total N/F(%)</b>	<b>1134</b>	<b>154 (13.8)</b>	<b>474 (41.8)</b>	<b>335 (29.5)</b>	<b>171 (15.1)</b>

<sup>a</sup>Strength sport include weightlifting, body-building, etc.

<sup>b</sup>Recreational sport, which are combined with athletic sport, include running, jogging, swimming, gymnastics, cycling, dancing, tennis, golf, roller-skating, horse-riding, etc.

<sup>c</sup>Team sport, which are combined with martial arts and combat sport, include basketball, baseball, soccer, football, volleyball, softball, taekwondo, judo, karate, boxing, etc.

<sup>d</sup>No sport means non-participation in any sport.

Of the total respondents, 14% (n=154) participated in strength sport as their leisure pursuits; 42% (n=474) participated in recreational sport; 30% (n=335) took part in team sport; and 15%

(n=171) did not play any sport. When compared to male (5%) college students, a larger proportion of female students (22%) did not participate in any sport. In terms of college students of different ethnicities, 23% of Non-white students and 13% of White students did not participate in any sport. Regarding students' passive leisure pursuits in watching TV, videos and DVDs on weekdays, 20% of the total respondents spent less than 1 hour per day on these activities whereas 80% spent at least 1 hour per day on them. Furthermore, around 46% of the college student respondents reported not playing any computer or video games on weekdays while 54% spent at least 1 hour per day engaging in this passive leisure activity.

### Bivariate relationships

Chi-square significance tests were used to examine associations between different types of active leisure activities and other correlates of interest. All of the variables, including gender, ethnicity, hours of studying, weight, watching TV, videos or DVDs on weekdays, and playing computer or video games on weekdays, showed significant associations with active leisure activity (Table 2).

TABLE 2: BIVARIATE ASSOCIATIONS WITH ACTIVE LEISURE OF COLLEGE STUDENTS

Correlate ( <i>df</i> )	Active leisure			
	<sup>a</sup> Strength sport (n=154)	<sup>b</sup> Recreational sport (n=474)	<sup>c</sup> Team sport (n=335)	<sup>d</sup> No sport (n=171)
	X <sup>2</sup>		<i>p</i>	
Gender (3)	207.96		<0.001*	
Race (3)	16.46		<0.001*	
Hrs of studying (6)	10.42		0.108*	
Weight (9)	100.73		<0.001*	
Watching TV/video on weekdays (6)	19.67		0.003*	
Playing video games on weekdays (6)	50.85		<0.001*	

<sup>a</sup>Strength sport are not limited to weightlifting and body-building.

<sup>b</sup>Recreational sport (which are combined with athletic sport) are not limited to running, jogging, swimming, gymnastics, cycling, dancing, tennis, golf, roller-skating, horse-riding, etc.

<sup>c</sup>Team sport (which are combined with martial arts and combat sport) are not limited to basketball, baseball, soccer, football, volleyball, softball, taekwondo, judo, karate, boxing, etc.

<sup>d</sup>No sport = Non-participation in any sport.

\* *p*<0.25

### Multivariate analyses

The results of multinomial logistic regression analyses showed that all of the variables emerged as important predictors of active leisure participation (Table 3.1 & 3.2). In particular, gender, ethnicity, hours spent on studying, action of weight, watching TV, videos or DVDs on weekdays, and playing computer or video games were significant predictors for active leisure participation before and after controlling for all other variables in the model.



TABLE 3.1: UNADJUSTED ODDS RATIO: MULTINOMIAL LOGISTIC REGRESSION ANALYSES OF PREDICTORS OF ACTIVE LEISURE

Predictor	Strength <sup>f</sup> sport (n=154)		Recreational <sup>g</sup> sport (n=474)		Team <sup>h</sup> sport (n=335)	
	<sup>b</sup> OR	<sup>d</sup> 95% CI	OR	95% CI	OR	95% CI
<i>Gender</i>						
Male	15.7**	8.9-27.8	2.2**	1.3-3.7	10.1**	6.1-16.9
Female	1.00	reference	1.00	reference	1.00	reference
<i>Race</i>						
White	1.8*	1.0-3.0	2.3**	1.5-3.5	1.5*	1.0-2.3
<sup>a</sup> Non-White	1.00	reference	1.00	reference	1.00	reference
<i>Hours of study</i>						
10 hrs or less	0.5	0.2-1.2	0.3*	0.1-0.8	0.6	0.2-1.3
11-20 hrs	0.4*	0.1-1.0	0.3**	0.1-0.7	0.5	0.2-1.2
21 hrs or more	1.00	reference	1.00	reference	1.00	reference
<i>Weight</i>						
Stay the same weight	1.5	0.7-3.3	1.8*	1.1-3.3	1.7	0.9-3.2
Gain Weight	7.2**	2.9-17.6	1.7	0.7-3.9	4.6**	2.1-10.0
Lose Weight	1.30	.6-2.6	2.1**	1.2-3.6	1.0	0.6-1.8
No Action	1.00	reference	1.00	reference	1.00	reference
<i>Watch TV/video</i>						
Less than 1 hr/day	1.8	0.8-3.8	2.9**	1.5-5.2	1.1	0.6-2.2
1-3 hrs/day	1.6	0.8-2.9	2.0**	1.2-3.2	1.3	0.8-2.1
4 or more hrs/day	1.00	reference	1.00	reference	1.00	reference
<i>Play video games</i>						
Do not play games	0.4**	0.2-0.6	0.9	0.6-1.4	0.3**	0.2-0.5
Less than 1 hr/day	0.6	0.3-1.2	0.9	0.5-1.5	0.7	0.4-1.2
At least 1 hr/day	1.00	reference	1.00	reference	1.00	reference

Note: Reference group is "I do not play any sports" (n=171)

\* p<0.05 \*\* p<0.01

<sup>a</sup>Non-white= African-American, Hispanic, Asian/Pacific Islander, etc.

<sup>b</sup>OR= Unadjusted odds ratio <sup>d</sup>CI = Confidence interval <sup>e</sup>NS= Not significant

<sup>f</sup>Strength sport = Sport not limited to weightlifting, body-building, etc.

<sup>g</sup>Recreational sport combined with athletic sport= Sport not limited to running, jogging, swimming, gymnastics, cycling, dancing, tennis, golf, roller-skating, horse-riding, etc.

<sup>h</sup>Team sport combined with martial arts and combat sport= Sport not limited to basketball, baseball, soccer, football, volleyball, softball, taekwondo, judo, karate, boxing, etc.

Specifically, compared to those who did not play any sport, male college students were more likely than their female counterparts to participate in strength sport (adjusted OR=16.0; CI=8.3–31.8), recreational sport (adjusted OR=3.2; CI=1.7–5.7), and team sport (adjusted OR=9.2; CI=5.4–17.6).

TABLE 3.2: ADJUSTED ODDS RATIO: MULTINOMIAL LOGISTIC REGRESSION ANALYSES OF PREDICTORS OF ACTIVE LEISURE

Predictor	Strength <sup>f</sup> sport (n=154)		Recreational <sup>g</sup> sport (n=474)		Team <sup>h</sup> sport (n=335)	
	<sup>c</sup> AOR	95% CI	AOR	95% CI	AOR	95% CI
<b>Gender:</b>						
Male	16.0**	8.2-31.5	3.2**	1.7-5.7	9.2**	5.1-16.6
Female	1.00	reference	1.00	reference	1.00	reference
<b>Race:</b>						
White	1.9*	1.1-3.6	1.9**	1.1-2.9	1.6*	1.1-2.6
<sup>a</sup> Non-White	1.00	reference	1.00	reference	1.00	reference
<b>Hours of study</b>						
10 hrs or less		<sup>c</sup> NS	0.4*	0.2-0.9		NS
11-20 hrs		NS	0.3**	0.1-0.7		NS
21 hrs or more		1.00 reference		1.00 reference		1.00 reference
<b>Weight</b>						
Stay the same weight	2.1	0.9-4.8	2.0*	1.1-3.7	2.2*	1.1-4.4
Gain Weight	2.7	0.9-7.3	1.1	0.4-2.7	1.8	0.7-4.4
Lose Weight	2.5*	1.1-5.4	2.6**	1.5-4.5	1.7	0.9-3.1
No Action	1.00	reference	1.00	reference	1.00	reference
<b>Watch TV/video</b>						
Less than 1 hr/day	3.1**	1.3-7.4	3.1**	1.6-5.8		NS
1-3 hrs/day	2.0*	1.1-4.0	2.1**	1.2-3.5		NS
4 or more hrs/day	1.00	reference	1.00	reference		1.00 reference
<b>Play video games</b>						
Do not play games		NS		NS	0.5*	0.3-0.9
Less than 1hr/day		NS		NS	0.8	0.4-1.4
At least 1 hr/day	1.00	reference	1.00	reference	1.00	reference

Note: Reference group is "I do not play any sports" (n=171)

\* p<0.05 \*\* p<0.01

<sup>a</sup>Non-white= African-American, Hispanic, Asian/Pacific Islander, etc.

<sup>c</sup>AOR= Adjusted odds ratio <sup>d</sup>CI = Confidence interval <sup>e</sup>NS= Not significant

<sup>f</sup>Strength sport = Sport not limited to weightlifting, body-building, etc.

<sup>g</sup>Recreational sport combined with athletic sport= Sport not limited to running, jogging, swimming, gymnastics, cycling, dancing, tennis, golf, roller-skating, horse-riding, etc.

<sup>h</sup>Team sport combined with martial arts and combat sport= Sport not limited to basketball, baseball, soccer, football, volleyball, softball, taekwondo, judo, karate, boxing, etc.

In comparison with students who did not play any sport, non-Hispanic Whites were more likely than Non-white students to engage in strength sport (adjusted OR=1.9; CI=1.1–3.4), recreational sport (adjusted OR=1.9; CI=1.1–2.9), and team sport (adjusted OR=1.6; CI=1.1–2.6). Compared to those who did not participate in any sport, college students who spent 10 hours or less (adjusted OR=0.4; CI=0.2–0.9) and 11 to 12 hours (adjusted OR=0.3; CI=0.1–0.7) studying for classes were less likely to play recreational sport than those who spent 21 hours or more studying for classes.

Furthermore, compared to those who did not play any sport, students who tried to stay the same weight were more likely to participate in recreational sport (adjusted OR=2.0; CI=1.1–

3.8) and team sport (adjusted OR=2.2; CI=1.1–4.4) than those who did not try to do anything about their weight. Those who tried to lose weight were more likely to play strength sport (adjusted OR=2.5; CI=1.1–5.4) and recreational sport (adjusted OR=2.6; CI=1.5–4.5) than those who did nothing about their weight.

Interestingly, in comparison with students who did not play any sport, those who spent less than 1 hour per day watching TV, videos or DVDs on weekdays were more likely to engage in strength sport (adjusted OR=3.1; CI=1.3–7.4) and recreational sport (adjusted OR=3.1; CI=1.6–5.8) than those spending 4 or more hours per day. Those spending 1-3 hours per day watching TV, videos or DVDs on weekdays were more likely than those spending 4 or more hours per day to play strength sport (adjusted OR=2.0; CI=1.1–5.4) and recreational sport (adjusted OR=2.6; CI=1.5–4.5).

These two findings supported the prediction of the Catharsis Theory that college students who spent more time on watching TV, videos and DVDs were less likely to engage in active leisure activities. On the contrary, college students who did not play computer/video games on weekdays were less likely to participate in team sport (adjusted OR=0.5; CI=0.3–0.9) than students who spent at least 1 hour per day when compared to those who did not play any sport. In other words, this finding supports the prediction of the Stimulation Theory that college students who spent more time on sedentary leisure activities were more likely to participate in active leisure activities than their counterparts.

## DISCUSSION

Mixed findings from this study uphold both the Catharsis Theory and the Stimulation Theory as theoretical frameworks for understanding the relationships between college students' sedentary leisure and active leisure pursuits. The Catharsis Theory states that college students who spent more time on watching TV, videos and DVDs were less likely to engage in inactive leisure activities. In particular it was found that college students who spent less than 3 hours per day watching TV, videos or DVDs on weekdays were more likely to engage in strength sport and recreational sport than those spending 4 or more hours per day watching TV, videos or DVDs. The Stimulation Theory suggests that participation in a sedentary leisure activity such as watching TV or playing video games can stimulate people's emotion to attend more active leisure activities. The research findings support this theory in that college students who did not play computer/video games on weekdays were less likely to participate in team sport than those who spent at least 1 hour per day on the games.

However, both the Catharsis Theory and the Stimulation Theory are only supported by half of the "sedentary leisure" constructs of either watching TV, videos or DVDs or playing computer games during the week. This finding is consistent with the argument of Witt and Bishop (2009) that different theories provide rationale for different types of leisure activities because people favour different leisure activities after having been in certain antecedent situations. For example, the situations constructed to fit the Catharsis Theory are most likely to be associated with "seeking a quiet place" and "hiking or walking", but less likely for all high energy activities. The situations of available energy and non-tension are highly correlated with the desire for active endeavours.

These mixed findings are notable in two ways. On the one hand, these variables were entered last in the multinomial logistic regression model so that, even after the variance in the outcome variable was accounted for by all other variables entered in the model, these variables were still significant predictors of three types of active leisure activities. On the other hand, there is an alternative explanation stating that leisure time spent on different types of leisure activities that reasonably compete with each other was controlled by including college students' time spent on their major task, which is studying. In particular, in the fully-adjusted model the college students who spent more time on studying were more likely to take part in recreational sport than those spending less time on studying.

In this study, the college students who spent less time on watching TV, video or DVDs on weekdays were more likely to participate in strength and recreational sport. This finding is in agreement with previous research. For example, Bennett *et al.* (2006) found that each hour of television viewing on an average day was associated with a decreased likelihood of engagement in pedometer-determined physical activity in adults. In addition, our finding empirically confirms the suggestion addressed by Bennett *et al.* (2006:1681) that "as part of a comprehensive physical activity promotion plan, recommendations to reduce television viewing should be made". Another practical implication of this finding is that among different types of active leisure activities, the promotion of comparatively less competitive active leisure activities, such as recreational sport and strength sport may influence college students' involvement in sedentary leisure behaviour, particularly with respect to "screen time viewing". Given that this research focused only on a limited number of sedentary and active leisure activities, further research is required relating to how other types of active leisure activities are influenced by other sedentary leisure pursuits.

Another finding from this study was that college students who spent more time on playing computer or video games on weekdays were more likely to participate in more competitive sport after all other variables were controlled. The results of this study showed that those college students were more likely to participate in team sport. One plausible explanation for this apparent contradiction is that the common belief about the relationship between sedentary leisure and active leisure participation mainly focused on the physical dimension of leisure participants rather than on their mental dimension. Playing video games demands a comparatively higher degree of mental concentration than other sedentary leisure activities (watching TV) (Russell, 2002). Therefore, based on the Stimulation Theory, a person's mentality is stimulated to become involved in a similarly mentally demanding leisure activity (team sport).

These observations suggest notable implications for future studies on sedentary leisure behaviour. In previous research, watching TV and playing video games were generally regarded as "sedentary behaviour" or "screen time" (Strauss *et al.*, 2001; Gordon-Larsen *et al.*, 2004) and were measured using a single item. However, findings from this study indicate that these two sedentary leisure activities have different associations with various types of active leisure activities and should be measured using separate items (Devellis, 2003). Chambers and Ascione (1987) indicated that watching television and playing electronic games may demand different degrees of mental effort and will thus have different impacts on participants. The results among the college students seem to confirm the above assertion insofar as the leisure pursuit of watching TV, videos and DVDs may be a better predictor of

recreational and strength sport, whereas playing computer or video games may better predict team sport.

Since the Catharsis Theory refers to the need for purging emotional tension and anxiety, it is applicable as an explanation of why people choose to engage in leisure activities that demand low mental concentration. In contrast, the Stimulation Theory refers to the need for pursuing arousal and high level of physical and mental activity. It is better suited as an explanation for why people seek leisure activities that involve high mental concentration no matter whether it is active or sedentary leisure.

While all other variables in the multinomial logistic regression model are controlled, gender was found to be predictive across different types of participation in active leisure activities. It was found that, when compared to those who did not play any sport on weekdays, male college students were more likely than female students to engage in strength, recreational and team sport (which is consistent with previous research). One example is that Sylvia-Bobiak and Caldwell (2006) found that male college students reported higher participation in active leisure than female students. The result confirmed here suggests that the promotion of active leisure participation through provision of different kinds of sport may be more effective for male rather than for female college students.

Ethnicity was another significant predictor of two types of active leisure activities: strength and recreational sport. In comparison with the college students who did not play any sport on weekdays, non-Hispanic White students were more likely than Non-white students to engage in strength and recreational sport. This finding supports previous studies. Sallis *et al.* (2000), reviewing 54 studies between 1970 and 1998 for potential correlates of physical activity among adolescents and young adults, found most consistently that non-Hispanic Whites were more active than other ethnic groups.

## CONCLUSION

Whereas previous studies on physical activity mainly focused on the various levels of physical exertion across different ethnicities (McKenzie *et al.*, 1992; Gordon-Larsen *et al.*, 2004) such as moderate to vigorous physical activity, this study has considered the various types of leisure time physical activities across different ethnicities. These findings have therefore produced additional in-depth conclusions as compared to previous studies in that health-promotion interventions can be targeted specifically at strength and recreational sport for non-Hispanic White students.

Findings from this study should be interpreted by taking the following limitations into account. Firstly, the data were not collected via the probability sampling technique and therefore a biased selection of samples may have been obtained. For future studies it is recommended that different sampling methods (such as probability sampling) be used to acquire a representative sample. Secondly, in this study the measurement of watching TV, video or DVDs on weekdays and playing computer or video games was not media-content-specific. Therefore, as this was not analysed, comment cannot be made on how specific media content would influence college students' active leisure behaviour. It is important that future research on leisure behaviour takes this into consideration. In addition, though the two

dimensions of leisure behaviour (the levels of mental versus physical energy exertions) are useful to explain the relationship between sedentary and active leisure participation, further empirical examination is still needed. Lastly, active leisure was measured in this study by using self-report measures. Although the use of this measure is quite common in studies on physically active leisure among college students, biased results may have been obtained by applying this subjective measure.

Despite these limitations, the results of this study contribute to the literature by providing additional information with respect to the relationship between different kinds of active leisure activities and two important sedentary leisure pursuits among college students. The findings have produced important implications for campus health promotion programmes and for future studies on the relationships between different kinds of leisure activities.

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